

From a study of the recent monograph of the West Indian species,* we find that the plants most nearly related to *Mikania alba* are evidently *M. papillosa* Klatt of Hispaniola and *M. Swartziana* Griseb. of eastern Cuba.

From the former the new plant presents marked differences in the stem, which is angled in *papillosa*, round in *alba*; in having entire, not lobed leaves as in the Hispaniola plant, and in having a reticulate-rugose instead of a nearly smooth surface as in *papillosa*. The inflorescence in *alba* is paniculate-racemose; in *papillosa*, axillary, solitary, or sometimes a simple raceme. The corolla of the new plant is white, in *papillosa* it is yellow.

The differences between *Swartziana* and *alba* are chiefly in the lanceolate-ovate, not ovate leaves. The pappus of the new plant is scarcely longer than the involucre bracts, in *Swartziana* it is conspicuously so. The corolla lobes in *alba* are thrice shorter than the tube, in *Swartziana* "lobis breviter oblongis erectis tubo toto 5-6plo brevioribus."

The new plant differs from both the older ones in having a subtending bractlet that much exceeds the pedicel.

NORMAN TAYLOR

NEW YORK BOTANICAL GARDEN.

REVIEWS

DeVries' Plant Breeding †

This work will be eagerly read by the scientific world and the general public because of the remarkable achievements of Nilsson (made public now for the first time) and also for the impartial and appreciative account of Burbank's work. No less important is the discussion of the principles that underlie plant breeding.

In 1901 Nilsson became director of a private company that had been established in 1886 for the improvement of various agricultural crops in Sweden that were slowly but manifestly de-

* Urban, I. *Symbolae Antillanae seu fundamenta Florae Indiae Occidentalis*. 5: 212. 1907.

† DeVries, Hugo. *Plant Breeding*. Comments on the experiments of Nilsson and Burbank. 8vo. vi + 360. f. 1-114. The Open Court Publishing Company. Chicago and London. 1907.

teriorating and so lessening the value of harvests. It soon became manifest that the German method of ameliorating a given variety of grain by multiple selection was a failure and that any success was very exceptional, in fact a mere matter of chance. Nilsson brought to the solution of the problem a full knowledge of the laws of variability and inheritance and early in his work made the remarkable discovery that each of the so-called varieties of agricultural crops was in reality made up of a great series of distinct strains or elementary species. The number of these elementary species is surprising; for example, in the common peas 500 distinct forms have been separated and each variety of the cereals is composed of several hundred forms. More remarkable still is the degree of variation among these elementary species, which far exceeded all the expectations based upon their divergencies when first selected. In fact it was found that when these elementary forms were isolated and bred that they produced offspring so divergent in morphological characters and qualities as to meet practically any demand that the farmers required. Some were suitable for light soils, others for heavy; some were early and others late in ripening. They differed in stiffness of culms, length of ears, size and number of grains, etc. This discovery revolutionizes the common method of plant breeding. All success depends upon the initial selection of a pure strain. Manifestly the old multiple selection must result in the association of several strains — some being poor or indifferent — with the result that the offspring will be a mixture and fall short of a high standard. These early experiments demonstrated that the plant develops according to its inherent nature and that it can not be made to conform to a desired pattern. So the old idea of ameliorating a crop by repeated selections must be abandoned. A single initial selection is the important point.

Not less important from a practical standpoint was the work of Nilsson in studying the relation or correlation between the botanical characters of the elementary species and their agricultural qualities. No sooner was it discovered that the elementary species are so divergent as to meet almost any demand of the breeder than the need of a system was felt whereby the desired

quality could be recognized by external characters. This led to an elaborate study of all the traits and qualities of numerous crops with the result that slowly a system has been established for many of the grains, peas, vetches, etc., by which definite qualities can be recognized from a study of their morphological characters. The results of this work in the rapid improvement of crops can scarcely be estimated. Success is now obtained in a few years with a directness and certainty that was impossible by the old method after twenty years of work.

Naturally de Vries makes full use of this work in fortifying his mutation theory, and it will be conceded that his present discussion comes nearer to placing his theory upon an incontrovertible basis than do any of his other writings. It would appear that in order to establish his thesis it now remains for him to show only that the continuous variations of his mutants do not overlap those of the parents.

While much that is misleading has been published about Burbank, sufficiently accurate statements have been made to render his achievements familiar to all. Even his most misguided friends will recognize the scientific and appreciative consideration that is given to Burbank's work. Burbank is an idealist. While interested in the scientific aspects of horticulture he is primarily desirous of giving to his fellow men better foods and fruits and more attractive flowers, and in the cheapest form in order to dispense their enjoyment as widely as possible. No better measure of the man could be given than his dream of a spineless cactus that by its adaptability to arid regions and its edible qualities would make possible the doubling of the population of the world.

Burbank's work is prosecuted on lines quite distinct from those of the Swedish company. He is little concerned with the improvement of a race or elementary species. His results are largely gained by hybridizing. In this work he is guided by two principles that are not generally tried by other breeders. He does not rely upon the association of a few qualities in his hybrids, but all the desirable traits possible are added at once for the purpose of producing a chaos of forms from which valuable selections may be made. Thus in the California lily, *Lilium pardali-*

num, many of the known lilies of the world have contributed their peculiarities to the enrichment of the native form. Secondly, Burbank makes a study of the characteristics and qualities of his plants in all stages of their development, and this knowledge enables him to introduce promising traits and secure more desirable and direct results than other breeders.

It is popularly believed that these improved forms are new creations. Hybridizing only introduces a new combination of characters. No new ones are added. Every novelty has its basis in some previously existing form. Thus, his stoneless prune was derived from a worthless French variety, *prune sans noyau*, by adding this trait to a cultivated form.

Mention only can be made of other important features of the book. An excellent résumé of the mutation theory is presented in the introduction and a very important chapter to American farmers appears in the discussion of the methods that should be followed in corn breeding. With a crop yielding last year 2700 million bushels, valued at over a billion dollars, it will come with something of surprise to learn that little in the way of systematic breeding was attempted until ten years ago; and we infer that the best work remains to be undertaken.

The closing chapter on the geographical distribution of plants contains several discussions that will be taken with reservations by many. As especially timely may be mentioned his characterization of many of the speculations upon adaptations as merely "poetical descriptions of the way in which we should like to understand and admire nature, but not facts capable of direct proof." In this connection we cannot refrain from mentioning with some amusement (and we are sure Professor deVries will join us) that even the most careful may fall into errors of this nature, as when the author refers to plants maintaining a position of safety on the mountain tops through "dread of their enemies in the valley," (p. 340) and to plants "seeking conditions" (p. 335).

The work of Nilsson and his collaborators has heretofore been almost entirely concealed from the public owing to the fact that the aim of the company has been neither educational nor directed primarily to scientific researches. Its sole object has been the

amelioration of agricultural crops. In presenting this scientific discussion of plant breeding, Professor deVries has given us one of the most valuable contributions to botanical science in recent years.

CARLTON C. CURTIS.

COLUMBIA UNIVERSITY.

NEWS ITEMS

Dr. Heinrich Hasselbring, assistant in botany in the University of Chicago, has been appointed assistant botanist at the Cuban Agricultural Experiment Station, at Santiago de las Vegas.

Dr. C. B. Robinson, assistant curator, New York Botanical Garden, spent two or three weeks of his summer vacation in making collections at the Bay of Seven Islands, Saguenay, Quebec.

Mr. Elmer D. Merrill, botanist of the Bureau of Science of the Government of the Philippine Islands, has recently devoted a week to studies in the herbarium and library of the New York Botanical Garden.

Mr. Allen H. Curtiss, well known as a collector and student of the plants of the southern United States and of the West Indies, died in Jacksonville, Florida, on September 1, in the sixty-third year of his age.

Dr. and Mrs. N. L. Britton are spending the month of September on the island of Jamaica. It is expected that the southwestern part of the island, where comparatively little botanical collecting has been done, will receive a large share of their attention at this time.

A "readership" in forestry has been established in Cambridge University and the appointment to the new position has been awarded to Dr. Augustine Henry, who is especially well known to botanists by his collections in China and Formosa. Dr. Henry visited the United States and Canada last autumn for the purpose, chiefly, of studying forestry conditions.

Dr. Carl Skottsberg, who was a member of the Swedish Antarctic Expedition of 1901-'03 and has since been engaged in studying his collections of the marine vegetation of that region,